IN THE DRAWINGS:

Please amend FIG. 6, as indicated on the attached marked-up copy of original FIG. 6. No new matter is introduced.

REMARKS

This Amendment After Final Rejection is submitted in response to the outstanding final Office Action, dated May 12, 2005. The present application was filed on December 18, 2001 with claims 1-21. Claims 5-8 and 15-18 were cancelled, without prejudice, and new claims 22-25 were added in the Corrected Amendment and Response to Office Action dated April 7, 2005. Claims 1-4, 9-14, and 19-25 are presently pending in the above-identified patent application. In this response, Applicants propose to amend claims 23-25 and cancel claims 11-20, without prejudice, herein. No additional fee is due.

This amendment is submitted pursuant to 37 CFR §1.116 and should be entered. The Amendment places all of the pending claims following entry of the amendments, i.e., claims 1-4, 9, 10, and 21-25, in a form that is believed allowable, and, in any event, in a better form for appeal. It is believed that examination of the pending claims as amended, which are consistent with the previous record herein, will not place any substantial burden on the Examiner.

In the Office Action, the Examiner required restriction of the claims under 35 U.S.C. §121 and objected to claims 23-25 due to indicated informalities. The Examiner asserts that the Amendment and Response to Office Action filed on April 11, 2005, did not include an amended FIG. 6 as indicated in the response. The Examiner rejected claims 2 and 3 under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement, rejected claims 22-25 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention, and rejected claims 22-26 under 35 U.S.C. §112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. The Examiner rejected claims 1-3, 21, and 22 under 35 U.S.C. §102(b) as being anticipated by Amca et al. (Amca, H.; Yenal, T.; Hacioglu, K.; Adaptive Equalisation of Frequency Selective Multipath Fading Channels Based on Sample Selection, IEEE Proceedings Communications, Volume 146, Issue 1, Feb. 1999, Pages 55-60), rejected claim 4 under 35 U.S.C. §103(a) as being unpatentable over Amca in view of Bottomley (United States Patent Number 5,680,419 A), and rejected claims 9

and 10 under 35 U.S.C. §103(a) as being unpatentable over Amca and Bottomley in view of Ghosh et al. (United States Patent Number 6,734,920 B2).

Restriction Requirement

The Examiner required restriction of the claims under 35 U.S.C. §121 to one of the following inventions:

Group I: claims 1-10 and 21 drawn to a method for decoding a Multidimensional code; and

Group II: claims 11-20 drawn to a Reduced State Sequence Estimation decoder for a Multidimensional code.

Applicants previously selected Group I, claims 1-10 and 21, for prosecution on the merits and propose to cancel claims 11-20, without prejudice, herein.

Drawings

The Examiner asserts that the Corrected Amendment and Response to Office Action filed on April 11, 2005, did not include an amended FIG. 6 as indicated in the response. Applicants submit herewith a marked up copy of original FIG. 6 to correct a typographical error.

Formal Objections

Claims 23-25 were objected to because they depend from cancelled claims.

Claims 23-25 have been amended to correct typographical errors and now depend from the proper claims. Applicants respectfully request that the objections to the cited claims be withdrawn.

Section 112 Rejections

Claims 2 and 3 were rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement, claims 22-25 were rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention, and claims 22-26 were rejected under 35 U.S.C. §112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections.

Regarding claim 2, the Examiner asserts that "nowhere does the Applicant teach the new matter, 'the symbol components of one multidimensional code symbol are transmitted over more than one symbol interval associated with one of said symbol components'" recited in claim 2, and that the disclosure instead teaches that multidimensional codes are transmitted over multiple one-dimensional symbol durations.

Applicants note that a person of ordinary skill in the art would recognize that "symbol components of one multidimensional code symbol" are multidimensional codes, that "more than one symbol interval" is equivalent to multiple one-dimensional symbol durations in the context of the present invention, and that the cited text of claim 2 was described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. *See, e.g., Ralston Purina Co. v. Far-Mar-Co, Inc.,* 772 F.2d 1570, 227 USPQ 177 (Fed. Cir. 1985); *In re Kaslow,* 707 F.2d 1366, 217 USPQ 1089 (Fed. Cir. 1983). Further, Applicants note that word-by-word equivalence between the claims and specification is not required.

Regarding claim 3, the Examiner asserts that "nowhere does the Applicant teach the new matter, 'multidimensional code symbol comprises a number of transmitted symbol components that exceeds a number of available channels'" recited in claim 3, and that the disclosure instead teaches that multidimensional codes are transmitted over multiple one-dimensional symbol durations.

Applicants note that the specification teaches that "the disclosed RSSE technique for multidimensional codes applies where the number of trellis code dimensions exceeds the number of available channels." (Page 4, lines 19-21.) A person of ordinary skill in the art would recognize that this teaching conveys the text cited from claim 3, and that therefore the text cited from claim 3 was described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. *See, e.g., Ralston Purina Co.* and *In re Kaslow.*

Regarding claim 22, the Examiner asserts that the term "corresponding state" is a relative term which renders the claim indefinite, and that it is impossible to determine the relationship between symbols and corresponding states. The Examiner

further asserts that the omitted structural cooperative relationships are: the relationship between "error metric," "initial symbol component," "survivor symbols," "corresponding state," and any of the steps in claim 1.

Claim 22 requires the step of calculating an error metric for an initial symbol component using survivor symbols from a corresponding state to account for intersymbol interference. In light of the section in the specification entitled Calculation of ISI Estimates (page 9, line 19, to page 11, line 16), a person of ordinary skill in the art would recognize the structural cooperative relationships between the "error metric," "initial symbol component," "survivor symbols," and "corresponding state" recited in claim 22 and the steps recited in claim 1. The term "corresponding state" and its relationship with the cited symbols would be clear to a person of ordinary skill in the art in light of the above cited section and in particular the description in the specification between page 9, line 20 and page 10, line 18. The error metric $e1D_n(\rho_m, A)$ for an initial symbol component is computed for state ρ_m using survivor symbols $\hat{a}_{n-i}(\rho_m)$ from the same, that is corresponding state ρ_m to account for intersymbol interference according to equations (3), (5) and (7).

Independent Claims 1 and 21

Independent claims 1 and 21 were rejected under 35 U.S.C. §102(b) as being anticipated by Amca et al. Regarding claims 1 and 21, the Examiner asserts that Amca teaches compensating for intersymbol interference caused by previously decoded multidimensional code symbols (section 3.2 in col. 2 on page 57); and compensating for intrasymbol interference caused by symbol components within the same multidimensional code symbol (sentence above FIG. 3 on page 57 and the Abstract).

Amca does ***not*** teach to *compensate for intersymbol interference caused by previously decoded multidimensional symbols*. Applicants note that Amca describes an uncoded system that employs quadrature phase shift-keying (QPSK). QPSK and coherent QPSK are modulation and ***not*** *coding techniques*. Therefore, contrary to the Examiner's assertion, CQPSK is not a multidimensional code. Amca uses a feedback section that is fed with "detected symbols and thereby serves to remove the ISI arising due to past symbols." (Section 3.2 in col. 2 on page 57.)

Amca does ***not*** teach compensating for intrasymbol interference caused by

symbol components within the same multidimensional code symbol. Amca defines intrasymbol interference as the second term of equation (8) on page 56, while the first term of equation (8) is the desired term, and the third term is the intersymbol interference. When comparing the second and first term of (8), it is clear that *Amca defines intrasymbol interference as one symbol interfering with itself.* In the present invention, *intrasymbol interference is defined as one symbol component interfering with another symbol component within the same multidimensional code symbol.* As Amca differs from the present invention in terms of the definition of intrasymbol interference, the invention described in Amca that addresses the processing of intrasymbol interference does not apply to the invention described in the current invention that addresses the processing of intrasymbol interference.

Amca teaches in the Abstract that, to reach sample diversity at the DFE input, N samples are taken from each symbol and these samples are used to derive N different DFEs. A simple selection mechanism is introduced to select the best sampling phase and DFE to be used in the tracking mode. Also, the sentence above Figure 3 states that "we concentrated on the IaSI term and tried to minimise the impact on the system performance." Contrary to the Examiner's assertion, this sentence and the Absract do ***not*** teach to compensate for intrasymbol interference cased by symbol components within the same multidimensional code symbol. Independent claims 1 and 21 require compensating for intersymbol interference caused by previously decoded multidimensional code symbols; and compensating for intrasymbol interference caused by symbol components within a current multidimensional code symbol.

Thus, Amca does not disclose or suggest compensating for intersymbol interference caused by previously decoded multidimensional code symbols; and does not disclose or suggest compensating for intrasymbol interference caused by symbol components within a current multidimensional code symbol, as required by independent claims 1 and 21.

Claim 2

Claim 2 was rejected under 35 U.S.C. §102(b) as being anticipated by Amca et al. Regarding claim 2, the Examiner asserts that, by design, the CQPSK multidimensional modulation code is transmitted over multiple one-dimensional symbol

durations.

Applicants note that it is well defined in the art that *a QPSK symbol is transmitted at once*, and ***not*** over multiple one-dimensional symbol duration. The I and Q components of a QPSK symbol are transmitted at the same time, and ***not*** over more than one symbol interval.

Thus, Amca et al. do not disclose or suggest wherein the symbol components of one multidimensional code symbol are transmitted over more than one symbol interval associated with one of said symbol components, as required by claim 2.

Claim 3

Claim 3 was rejected under 35 U.S.C. §102(b) as being anticipated by Amca et al. Regarding claim 3, the Examiner asserts that, by design, the CQPSK multidimensional modulation code is transmitted over multiple one-dimensional symbol durations.

Applicants note that QPSK and cQPSK are modulation formats and not coding methods. *QPSK is neither a trellis code nor a multidimensional code*; therefore, trellis code dimensions are ***not*** defined. CQPSK symbols are uncoded 2-dimensional symbols that are transmitted over the I and Q channels; therefore, *the number of dimensions of these two-dimensional symbols do **not** exceed the number of available channels.*

Thus, Amca et al. do not disclose or suggest wherein said multidimensional code symbol comprises a number of transmitted symbol components that exceeds a number of available channels, as required by claim 3.

Claim 22

Claim 22 was rejected under 35 U.S.C. §102(b) as being anticipated by Amca et al. Regarding claim 22, the Examiner asserts that the Feedback Transversal Filter in FIG. 6 is used for calculating an error metric to be added to an initial symbol component received from the Feedforward Transversal Filter in FIG. 6 using survivor symbols d_k from a corresponding state to account for intersymbol interference.

Applicants note that FIG. 6 shows a standard DFE architecture and does ***not*** teach to calculate an error metric or an initial symbol component using survivor symbols from a corresponding state to account for intersymbol interfernce. The terms

survivor symbol and state are will defined for trellis-based detectors, such as RSSE detection, but *not* for decision-feedback equalizers, such as shown in FIG. 6. Also, the feedback section in FIG. 6 does ***not*** *feed back an error metric*, but the computed intersymbol interference, as can be learned from any standard text book, e.g. J.. G. Proakis, Digital Communications, McGraw-Hill, 3rd ed. Also, Amca does ***not*** teach that the output of the feedforward transversal filter is an initial symbol component. It is in effect an equalized signal, as can be read from any standard text book, e.g. J.. G. Proakis, Digital Communications, McGraw-Hill, 3rd ed.

Thus, Amca et al. do not disclose or suggest the step of calculating an error metric for an initial symbol component using survivor symbols from a corresponding state to account for intersymbol interference, as required by claim 22.

Dependent Claims 2-4, 9-10 and 22-25

Dependent claims 2-3 and 22 were rejected under 35 U.S.C. §102(b) as being anticipated by Amca et al., claim 4 was rejected under 35 U.S.C. §103(a) as being unpatentable over Amca in view of Bottomley, and claims 9 and 10 were rejected under 35 U.S.C. §103(a) as being unpatentable over Amca and Bottomley in view of Ghosh et al.

Claims 2-4, 9-10, and 22-25 are dependent on claim 1 and are therefore patentably distinguished over Amca et al., Bottomley, and Ghosh et al. (alone or in any combination) because of their dependency from independent claim 1 for the reasons set forth above, as well as other elements these claims add in combination to their base claim.

Conclusion

All of the pending claims following entry of the amendments, i.e., claims 1-4, 9, 10, and 21-25, are in condition for allowance and such favorable action is earnestly solicited.

If any outstanding issues remain, or if the Examiner has any further suggestions for expediting allowance of this application, the Examiner is invited to contact the undersigned at the telephone number indicated below.

The Examiner's attention to this matter is appreciated.

Respectfully submitted,

Date: August 12, 2005

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Annotated Sheet Showing Changes

FIG. 5

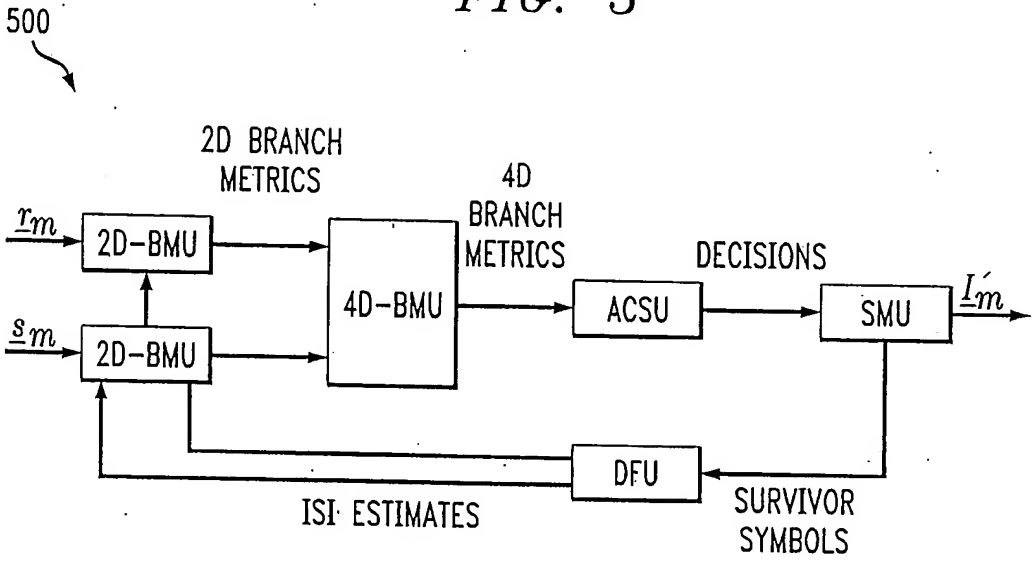

FIG. 6